Lightering Discussion

- Compared with the proposed SPM buoy system, reverse lightering operations require additional resources including the following:
  - Up to three, 750,000 bbl capacity service vessel round trip transits for each VLCC load event;
  - Tugs/Support ships for support vessel transits;
  - 65 mile service vessel transit route to lightering area (130 mile round-trip)
  - Fuel for propulsion of service vessels and tug/support ships; and
  - Onshore loading facilities for loading products into service vessels. This also results in greater ship channel traffic.

- Risks and potential complications associated with the lightering process include:
  - Increased system complexity, time, and delays:
    - On-shore loading of product to the lightering service vessels;
    - Transit of vessels to the lightering area and back;
    - Ship-to-Ship transfers at the lightering area;
    - Weather;
    - Vessel performance;
    - Combined, this adds approximately 10 days for a VLCC export delivery.
  - Increased risk of operational loss / logistical slippage.

- As summarized in the following comparison table, lightering operations generate more emissions than the proposed SPM buoy system because of the additional resources and emission sources from:
  - Initial loading of service vessels onshore;
  - Transit of the service vessels to the lightering zone;
  - Ship-to-Ship (STS) transfer of product to the VLCC; and
  - Return transit of the service vessels back to shore.

Table 1. Emission Comparison of Lightering To Proposed SPM Design

Items for Comparison	Operations	VOC	NO_x	CO	PM	SO_2	HAPs	CO_2e
Total Emissions (tpy)	Lightering	13,279	3,136	579	127	125	248	251,871
	Proposed SPM Design	10,855	1,673	343	69	88	201	134,484
Unit Emissions (ton/MMBBL)	Lightering	69.16	16.33	3.02	0.66	0.65	1.29	1,311.83
	Proposed SPM Design	56.54	8.71	1.79	0.36	0.46	1.05	700.44
Total Emissions (tpy)	**Emissions Reduction from Proposed SPM Design**	**2,424**	**1,463**	**236**	**58**	**37**	**47**	**117,387**
Unit Emissions (ton/MMBBL)		**12.6**	**7.62**	**1.23**	**0.30**	**0.19**	**0.24**	**611**